BACKGROUND

- The dramatic accrual of resistant bacterial pathogens concomitant with the dearth of novel antimicrobial agents is a call to action to encourage the adaptation of antimicrobial stewardship programs (ASP) and the implementation of effective interventions.
- Global increase in the rates of bacterial resistance manifested as the emergence different phenotypes of resistant bacteria such as MRSA, VRE, ESBL, CRE and MRD organisms urge health care providers and researchers to adopt effective treatment strategies and optimize antimicrobial utilization.
- Targeted interventions are needed to attain ASP objectives, for this purpose, we conducted this project in our institution to characterize prevalence of bacterial resistance and to evaluate the phenotypic/genotypic patterns in order to design an antibiogram.
- The findings from this study (phase I) will guide formulary restriction, empiric therapy selection and review of treatment protocols (phase II) and finally prospective evaluation of outcomes (phase III) as part of a comprehensive ASP.

PROJECT PHASES

Phase I: (Surveillance)
- A retrospective surveillance study was undertaken to compile and analyze data concerning bacterial phenotypes and resistance patterns of microbial isolates collected in Sahar hospital and affiliated centers, (Northern Oman).
- Construction of robust hospital ANTIBIограм in accordance with Clinical Laboratory Standards Institute (CLSI) document and the guidelines issued by Infectious Diseases Society of America (IDSA).
- Provide preliminary targeted interventions based on surveillance study to guide formulary restriction and selection of empiric therapy.

Phase II: (Clinical and Laboratory investigations)
- Identification of high resistant isolates (ESBL, CRE, High mortality rates Infections), gathering patients demographics, clinical data and review of treatment protocols.
- Utilizing dynamic in vitro lab experiment (hollow-fiber model) – collaboration with Philadelphia College of Pharmacy, USA – to test combined antimicrobial therapy for the highly resistant phenotypes.
- Application for a Project Grant from the Research Council – Sultanate Of Oman- to conduct laboratory experiments.

Phase III: (Prospective Evaluation of Outcomes)
- Establishment of a functional ASP program, with updated treatment guidelines and strategies of pharmacokinetic guided monitoring, formulary restriction, selection of empiric therapy and review of treatment protocols.
- Applying ASP metrics to accurately measure the process, the clinical outcomes, and the cost effectiveness of the implemented ASP.

METHODS

- Ethical approval of the research protocol was obtained from the research committee, Ministry of Health, Sultanate of Oman. The study conforms to all laws protecting patient confidentiality.
- We surveyed a convenience sample of all bacterial isolates collected by or referred to the central microbiology laboratory of Sahar Hospital between Jan. 1st, 2016 to Dec. 31st, 2017. (17,000 cultures)

ACHIEVEMENT

Surveillance Study & Publications

- Reporting of surveillance study describes epidemiology and susceptibility patterns of bacterial infections in Sahar Hospital.
- Sharing study results through poster presentation in the ID week (San Francisco – USA 2018), abstract was published in the Open Forum Of Infectious Diseases.
- Publishing of this study in the International Journal Of Infectious Diseases, to serve as a reference for research in the same field in Oman.

Ongoing research

- Surveying variables associated with positive A. baumannii infections in 520 cases, with identification of comorbidities, treatment failure causes, mortality pre-disposing factors and evaluation of antimicrobial treatment.
- Dynamic model testing of A. baumannii isolates against 4 antimicrobial drugs combination, as an experimental trial to find out an alternative for a high all-cause mortality rate hospital acquired infection.
- Surveying variables associated with positive CRE-caused infections, with identification of comorbidities, treatment failures, mortality pre-disposing factors and evaluation of antimicrobial treatment.

Future plans

- Lab experiment on double-carabapenem treatment of CRE resistant phenotypes isolated in Sohar Hospital Central Laboratory.

CONCLUSION

1) Highly resistant (ESBL & CRE) E. coli and K. pneumoniae is a significant cause of bloodstream infection in hospitalized patients (~12%). Empirical treatment options should be revised, drug-bug match therapy instituted promptly and newer agents considered.
2) Gram-negative isolates showed very rare resistance to colistin and tigecycline, thus in order to maintain efficacy of both antibiotics they should be restricted to be prescribed only by consultant Id.
3) Gram-positive isolates showed very rare resistance to daptomycin and linezolid, with low resistance (8–20%) to clindamycin, so its recommended to restrict its prescribing when no other alternative antimicrobials.
4) Growing resistance to ciprofloxacin and meropenem makes a call to restrict its use to cases where other antibiotics are not feasible.
5) ASP implementation based on adequate information about infections, resistance pattern and prescriber attitudes is a must in order to maximize clinical outcomes and minimize hospitalization costs.

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DISCLOSURE

The authors have nothing to disclose concerning financial or personal relationship with commercial entities that may have a direct or indirect interest in the subject matter of this presentation. For more information or a reprint, contact:
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